## REMARKS

Claims 1-17 are currently pending in the application. By this amendment, claims 1, 2, 5, 6, 10, 13, 14, 16, and 17are amended, claims 18-23 are cancelled (being drawn to a non-elected invention) and new claims 24-25 are added for the Examiner's consideration. The foregoing separate sheets marked as "Listing of Claims" show all the claims in the application, with an indication of the current status of each. The Commissioner is authorized to charge attorney's deposit account 50-2041 (Whitham, Curtis, Christofferson & Cook) for the additional independent claims (two in total based on previous amendments).

Cancellation of claims herein is without prejudice and is intended to accelerate prosecution of the application by simplifying outstanding issues. The Applicant reserves the right to pursue the subject matter of the cancelled claims, or claims to other disclosed subject matter, in one or more continuation applications.

**Summary of the present invention**

The present invention provides methods of producing carbon nanotubes. In particular, the invention provides methods of producing carbon nanotubes of a desired size and orientation at a particular desired position. Examplary embodiments are described and claimed in claims 1 and 10.

With respect to the method of claim 1, a carbon structure (e.g. amorphous carbon) is prepared and a catalyst substance is moved through the carbon structure. The movement of the catalyst creates a trail which crystallizes into a carbon nanotube (see, for example, paragraphs [0012] and [0076]- [0078] of the published application, and Figures 2A and B). Using this novel technique, it is possible to control the size and orientation of the carbon nanotube with high accuracy by adjusting the size and orientation of the carbon structure and the movement of the catalyst.

With respect to the method of claim 10, construction of the nanotube takes place in a similar manner but at a distance from a substrate, as described in paragraphs [0061] - [0069] of the published application, and illustrated in Figures 1A-D. In this illustration, the nanotube is

grown between raised carbon structures 2 and 4 using catalyst 3 and an electron beam. Again, it is possible to control the size and orientation of the carbon nanotube with high accuracy by adjusting the size and orientation of the raised carbon structures and the movement of the catalyst.

**Claim Rejections: 35 USC § 102(b)**

Claims 1, 2, 5, 6, 7 and 16 stand rejected under 35 USC § 102(b) as anticipated by Takai (US20050275331). This rejection is traversed.

Claims 1, 2, 5, 6, 7 and 16 of the present application recite a method of making carbon nanotubes as described above. In particular, the method of claims 1, 2, 5, 6, 7 and 16 is a novel method of making carbon nanotubes by moving a catalyst through a carbon structure (e.g. amorphous carbon) and crystallizing the trail region immediately behind the moving catalyst to form a carbon nanotube.

In sharp contrast to the present invention, Takai teaches the use of **pre-made** carbon nanotubes as the emitters of a cathode (paragraph [0008]. Takai describes or references several known methods of carbon nanotube production developed by others (e.g. Tennent, US patents 5,165,909 and 5,171,560, paragraph [0051]; Geus, US 5,691,054 paragraph [0053], and other patents disclosed in paragraphs [0054] - [0057]) as candidates for use in the cathode. In particular, the carbon nanotubes used by Takai are identified in paragraph [0060] as having been "obtained from Hyperion Catalysis International, Cambridge, Ma.." (Paragraph [0060]). The carbon nanotubes used by Takai to make the cathode may be treated prior to use (paragraph [0009]), i.e. subjected to energy, chemical plasma or mechanical treatment (see paragraph [0012]); they may be put into solution (paragraph [0061]), deposited onto a substrate (paragraph [0066], or heat treated after deposition but prior to use (paragraph [0067]). The treated carbon nanotubes may be the cathode, or may be attached to a substrate and, together with the substrate, form the cathode [paragraph 0012]. But whatever the final mode of use, and in contrast to the present invention, Takai does not teach any novel methods of **preparing** carbon nanotubes. Rather, Takai's invention is a cathode. All descriptions of the handling and treatment of carbon nanotubes in Takai assume that the nanotubes are already in existence (e.g. purchased as

described) and then treated or otherwise formed into a cathode. But the manufacture of carbon nanotubes is not part of the invention of Takai, and the production of carbon nanotubes is not described in or claimed by Takai.

Claims 10, 13, 14 and 15 stand rejected under 35 USC § 102(b) as anticipated by Takai (US20050275331). This rejection is also traversed.

Claims 10, 13, 14 and 15 recite a method of making carbon nanotubes as described in detail above (and see Figures 2A-D). In contrast, as discussed in the preceding paragraph, Takai provides a cathode that comprises carbon nanotubes but does not describe or claim the production of carbon nanotubes. In fact, Takai assumes that the carbon nanotubes will be made according to the methods of others and/or purchased. Therefore, the method of making carbon nanotubes as recited in claims 10, 13, 14 and 15 also cannot be anticipated by Takai.

In summary, the present invention provides methods of making carbon nanotubes, while the invention of Takai provides cathodes made of pre-made carbon nanotubes.

In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of this rejection.

**Claim Rejections: 35 USC § 103(a)**

Claims 3, 4, 8, 9 and 17 stand rejected under 35 USC § 103(a) as obvious over Takai (as above) in view of Ota (US20050245390 A1). This rejection is traversed.

As discussed above, Takai does not anticipate the present invention since Takai provides only cathodes that include carbon nanotubes that are already made, whereas the present invention provides methods of making nanotubes.

Ota teaches only a catalyst carrier made of crushed carbon fibers. According to Ota, crushing the fibers produces a fine carbon fiber with a multilayer structure in which continuity of the graphene structure is broken, thereby reducing electrical resistance and enhancing electric conductivity (see paragraph [0050]. Ota does not discuss making the carbon fibers that are to be crushed, other than to say that they are typically produced by vapor phase deposition and are preferably branched carbon fibers "produced by a method as described in, for example, JP-A-2002-266170 (WO02/49412)" paragraph [0063]. Clearly, like Takai, and in contrast to the

present invention, Ota does not teach any novel methods of making carbon nanotubes, but only ways to use carbon nanotubes that are already made. The various treatment steps cited by Examiner as taken from Ota merely offer ways to treat carbon nanotubes that are already in existence, not ways to manufacture them from amorphous or other suitable forms of carbon, as claimed in the present invention. Therefore, Ota does not cure, mitigate, or even address the defects of Takai as a reference, and no combination of Ota with Takai (or any other reference) renders the subject matter of the present invention obvious.

In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of this rejection.

**Claim amendments**

Claims 1 and 10 have been amended to recite language that further clarifies the meaning of the phrase "trail region". As described e.g. in the abstract, this is the region directly behind where the catalyst has moved i.e. the "trail" left by the catalyst as it moves through the carbon structure. In addition, claims 1 and 10 have been amended to recite that the step of crystallizing converts the trail region to a carbon nanotube. This language also does not add any new matter to the application, being found, for example, in the application as published in paragraphs [0011] and [0014] of the published application.

Claims 16 and 17 have hereby been amended to conform to standard US patent practice by reciting the steps of the method to which they refer, rather than simply reciting "the method of claim...". Applicant submits that these amendments do not add any new matter to the application, since the language introduced into the claims is taken directly from claims 1 and 10.

Claim 2 is hereby amended to replace "carbon structure" with "trail region" since claim 1 recites that it is the "trail region" of the carbon structure that is crystallized. Applicant submits that this amendment does not add any new matter to the application, being entirely formal in nature.

Claims 1, 2 and 10 have hereby been amended to recite "said" instead lf "the" to provide consistency throughout the claims, the majority of which recite "said" instead of "the".

Applicant submits that this amendment does not add any new matter to the application, being entirely formal in nature.

Applicant respectfully requests entry of these amendments and consideration and allowance of the amended claims.

**New Claims**

New claims 24 and 25 have hereby been added to the application. These claims parallel claims 16 and 17 of the application in that they recite 1) A method of producing a transistor and 2) A method of producing a wiring structure of carbon nanotube, respectively. However, claims 16 and 17 recite methods using the carbon nanotube producing method of claim 1, wherein new claims 24 and 25 recite methods using the carbon nanotube producing method of claim 10. Applicant submits that new claims 24 and 25 do not add any new matter to the application, the subject matter being fully disclosed e.g. in claims 1, 10, 16 and 17 of the application as filed.

Applicant respectfully requests consideration and allowance of claims 24 and 25.

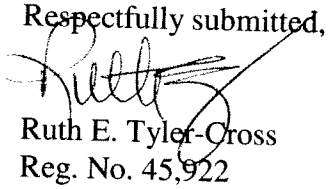
**Concluding Remarks**

In view of the foregoing, it is requested that the application be reconsidered, that claims 1-17 and 24-25 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at 703-787-9400 (fax: 703-787-7557; email: ruth@wcc-ip.com) to discuss any other changes deemed necessary in a telephonic or personal interview.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



Ruth E. Tyler-Cross
Reg. No. 45,922

Whitham, Curtis, Christofferson & Cook, P.C.
11491 Sunset Hills Road, Suite 340
Reston, VA 20190
703-787-9400 (Telephone)
703-787-7557 (Facsimile)

Customer No. 30,743